

NOTES ON THE GENUS *OPHIODESMA* (DIPT., STRATIOMYIIDAE).

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(Eleven Text-figures.)

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Introduction.

In January, 1933, the larvae and puparia of a species of Stratiomyid were collected in great abundance feeding on the moist, rotting tissue between the central core and outer wall of dead *Xanthorrhoea* stumps on the slopes of Mt. McDonald near Canberra. The following month a small species of *Ophiodesma*, which is described below as *O. minor*, emerged from the puparia.

Some adults and preserved larvae of another species of *Ophiodesma* were recently received from Mr. J. H. Bowen of the Forests Commission of Victoria. Later, in March, 1934, he sent a piece of grass-tree containing live larvae and puparia. Early in April a fly, which was identical with the dark-winged *Ophiodesma* bred by him, emerged from this material. This species was also new and is described below as *O. brunnipennis*.

Historical and Synonymy.

In 1896 Froggatt described the larva and adult of a Stratiomyid, which he bred, along with a number of other insects, from *Xanthorrhoea*. Froggatt believed this species to be identical with Bigot's *Ephippium albitarsis*. His brief description of the larva might apply to a number of Stratiomyiids, whilst his description and drawing of the adult are of little assistance in determining the species. However, the fact that he describes the wings as dusky and the antennae as spindle-shaped inclines one to believe that his species is the same as *O. brunnipennis*, n.sp., bred from *Xanthorrhoea australis* in Victoria.

In 1916 A. White published a revision of the Australian Stratiomyiidae. In this he erected the genus *Negritomyia* for *Ephippium albitarsis* Bigot. Specimens of *N. albitarsis* from North Queensland show it to be a very distinct fly from any of those bred from *Xanthorrhoea*. White also erected the genus *Ophiodesma* for *Odontomyia flavipalpis* Macquart. He considered *Ophiodesma* to be fairly typical of the subfamily Clitellarinae. The two new species bred from grass-tree agree with White's definition of *Ophiodesma*.

In 1920, Hardy recorded *Ophiodesma flavipalpis* as the only species of the genus. In 1932, he described a new species, *O. innoda*, from Queensland. This is closely related to the type species, differing chiefly in the frons of the female.

In Malloch's key to Dipterous larvae, the larvae described below run close to the Clitellarinae and to an unknown genus represented by a larva taken from a rat's nest. Most of the genera in this sub-family are aquatic, but *Hermetia*

is terrestrial. The larvae of this and of *Ophiodesma* have some points of resemblance, although on arrangement of body bristles and shape of head *Ophiodesma* is closer to Malloch's *genus incertus* 2. The arrangement of the mouth parts is very similar to that of *Nemotelus*, also a member of the Clitellarinae, as described and figured by Bischoff. This species, however, is aquatic. On the whole the relationships of the larvae of *Ophiodesma* seem to be with the aquatic Clitellarinae, rather than with any of the described terrestrial Stratiomyiidae.

Key to Species.

1. Frons of female with smooth central area and no interruption of median line *O. innodus* Hardy.
 Frons of female with central area corrugated and a ridge issuing from the median line 2
2. Antennae long and narrow, twice the head length, pubescence yellow *O. flavipalpis* Macq.
 Antennae shorter and spindle-shaped, from 1.3 head length to same length as head, pubescence silvery white 3
3. Wings smoky-brown, frons of female with few hairs, length 7.5 to 8 mm. *O. brunnipennis*, n. sp.
 Wings hyaline, frons of female more hairy, length 3 to 5 mm. *O. minor*, n. sp.

OPHIODESMA FLAVIPALPIS Macq.

White redescribed this species in 1916, when proposing the genus *Ophiodesma*. In 1932, Hardy gave a description of the frons of the female. I have examined specimens collected at National Park, Sydney. The species is readily distinguishable from those I have bred from *Xanthorrhoea* on the shape and length of the antennae and the yellow pubescence. *Distribution*.—New South Wales and Victoria.

OPHIODESMA INNODA Hardy.

This species has not been examined, but is apparently easy to distinguish by the smooth frons of the female. *Distribution*.—Queensland.

OPHIODESMA BRUNNIPENNIS, n. sp.

♀. The length is 8 mm. The whole body is black, with the exception of the tarsi, which are a dirty white. The thorax and undersurface of the abdomen are covered with short, flat, silvery-white hairs. The dorsal surface of the abdomen has some patches of these hairs along the lateral edges, the rest being black and shining. The scutellar spines are black and well separated. The whole surface of the body is minutely punctate.

The frons is a little more than one-quarter the head width, corrugated and rugose, without hairs except for two small patches behind the antennae and a few on the ocellar area. The margin behind the eyes is comparatively wide, with sparse silvery hairs. There is a fringe of silver hairs above the mouth. The antennae are one and one-third times the length of the head and are spindle-shaped. The first segment is twice as long as the second, the third is wider than these two, and the segments become narrower from the fourth to the tenth. The third segment is as long as the first and the rest are shorter. The apical segment is narrowest and is papilla-like. The wings are dark smoky brown. The abdomen is considerably broader than in *O. flavipalpis*.

♂. Similar to, but slightly smaller and narrower than, the female. The antennae are shorter and more slender, only slightly longer than the length of the

head. It differs chiefly from the female in having the dorsum of the thorax covered with a dense pile of upstanding black hairs and in having no silver pubescence on the thorax.

Distribution.—Anglesea, Victoria (January, 1933; April, 1934). Bred from *Xanthorrhoea australis*. The holotype male, allotype female and a paratype male are in the collection of the Division of Economic Entomology, Canberra.

OPHIODESMA MINOR, n. sp.

♀. The smallest fly just exceeded 3 mm. and the largest was 5 mm. in length. It is black with whitish tarsi, as in other species of the genus. The hairs on the thorax show a tendency to form lines. The body is covered with short, whitish hairs, sometimes tending to pale yellow. The dorsum of the abdomen is bare except for some patches of hairs on the sides. The scutellar spines are slightly longer than in the previous species and brownish in colour. The wings are hyaline. The frons is nearly one-third the head width and is covered with hairs except for the corrugated part near the middle. The antennae are about the same length as the head and have the same structure as in *O. brunnipennis*, but are slightly thicker.

♂. Similar to the female but rather more slender. The thorax is covered with a dense pile of whitish hairs.

This species differs from *O. flavipalpis* in the shape and length of the antennae, and from *O. brunnipennis* by its smaller size and hyaline wings.

Distribution.—Mt. McDonald, F.C.T., near Mullion Creek, N.S.W. (January, 1933). Bred from *Xanthorrhoea* species. The holotype male and allotype female are in the collection of the Division of Economic Entomology, Canberra. A number of paratypes are in the same collection.

Description of the larva of O. minor. (Text-fig. 1.)

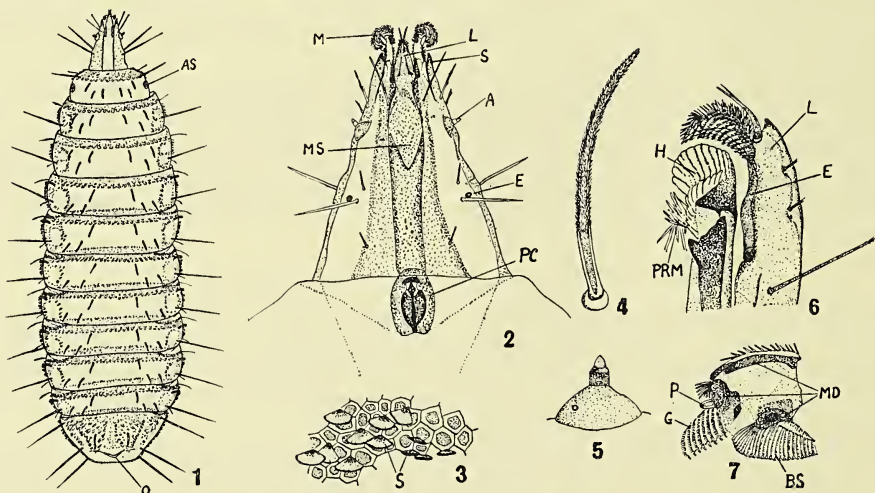
The length of the full-grown larva is from 8 to 9 mm. The skin is of a creamy colour, but the larva appears to be light brown on account of the dense covering of scales and hairs. It is somewhat cylindrical when young, but becomes flattened in the later stages, both dorsal and ventral surfaces remaining slightly convex with the lateral edges produced to a ridge.

The larva has eleven body segments and an elongate, conical head. All the body segments are much broader than long, with the exception of the eighth, which is almost as long as wide, with the lateral edges sloping towards each other posteriorly and the dorsal surface also sloping down posteriorly. The constrictions between the body segments are not very sharply pronounced. The body bristles are long and conspicuous, giving the larva a shaggy appearance. The integument is divided into hexagonal areas, but the markings are very faint and further obscured by the dense covering of scales, each arising in the angles between the hexagonal areas (Text-fig. 3). The integumental markings become more distinct on pupation.

On the dorsal surface of each segment, except the last, are six large bristles, three on each side of the centre. These project straight up from the back and then bend slightly towards the centre. On the thoracic segments these are arranged in triangular formation, there being a pair near the anterior border each side of the centre and one below and between them. On the abdominal segments the arrangement is a bristle near the anterior border and a more lateral pair near the posterior border on each side. There is only one pair of

corresponding bristles on the last segment near the centre. Laterally on the dorsal surface of each segment a large bristle projects outwards near the lower edge. In addition to these, on abdominal segments one to seven there is a shorter, thick, inwardly curved bristle laterally near the upper edge. The eighth segment has a pair of long bristles at the lower corners and a pair near the upper corners. All these bristles are compound, having a series of tiny spines up the sides (Text-fig. 4).

On the ventral surface of the thoracic segments there is a pair of bristles each side of the centre about the middle of the segment. These project straight down and are thin and bifid. Near the upper corner is a fine bristle projecting sideways and visible from above. The abdominal segments each have four fine bristles near the middle arranged in a straight line, two on each side of the centre. There is also a bristle at the upper corner and one at the lower, both visible from above, the upper one being larger and stronger. All the ventral bristles are finer than the dorsal. The last segment has four near the middle on each side of the anus, a large strong pair on the lower corners and a fine pair on the posterior edge.



Text-figs. 1-7. *Ophiodesma minor*.

- 1.—Larva, $\times 7.6$. *a*, anterior spiracle; *o*, opening of air chamber.
- 2.—Head of larva, $\times 37$. *a*, antenna; *e*, eye rudiment; *l*, labrum; *m*, maxilla; *ms*, median sclerite; *pc*, pharyngeal chamber; *s*, side lobe.
- 3.—Larval integument, $\times 133$. *s*, scales.
- 4.—Dorsal bristle of larva, $\times 120$.
- 5.—Antenna, $\times 120$.
- 6.—Labrum and hypopharynx, $\times 67$. *e*, epipharynx; *h*, hypopharynx; *l*, labrum; *prm*, prementum.
- 7.—Maxilla, $\times 67$. *bs*, banded segment; *g*, galea; *md*, mandible; *p*, palp.

The anterior border of each thoracic segment both dorsally and ventrally is thickly covered with an armour of several rows of tiny scales set closely together. The rest of the segment dorsally is clothed with larger, less heavily chitinated scales, many of which are fan-shaped and project from the surface, either standing straight up on end or sloping backwards (Text-fig. 3). They are more abundant along the sides, where they overlap like shingles. On the abdominal segments

the scales are also smaller, more closely set along the anterior and posterior borders, and larger and more loosely arranged on the rest of the segment. Some are divided at the ends, and there are all gradations from simple bristles to broad scales.

The ventral surface of the thoracic segments is not so scaly, the integument being simply divided into more or less hexagonal areas and devoid of upstanding scales, except near the lateral edges, where they occupy an area in the vicinity of the forked hairs. The abdominal segments are also smoother on the ventral surface, the scales being confined to the sides. On the ventral surface of the eighth segment, near the anterior border, is a semi-circular fold in the skin. The edges of this are sharply defined by strong bristles. At right angles to the fold and running from its centre longitudinally down the middle of the segment about half-way to the posterior border is the anal slit. The lips are armed on the inner edge with a series of strong inwardly and backwardly directed teeth. Running from the end of the slit to the posterior border is a deep narrow groove. The eighth segment is extremely bristly on the dorsal surface, except below the opening of the air chamber, which is situated in the centre of a transverse postero-dorsal groove. There is a pair of branched hairs just anterior to the pair of posterior bristles on the dorsal surface.

The spiracles.—The posterior spiracles are internal, opening into an air chamber situated beneath the dorsal surface on the last segment. The opening of the air chamber is protected by a pair of elliptically curved lips which are strongly chitinized and ornamented with a series of rounded bosses. The chamber which opens through these lips runs back to the posterior end of the anus. The spiracles open one each side of the anterior end of the air chamber. Each is ring-shaped, with a strong chitinous rim bearing a pattern of bars and scallops similar to the slits in a Calliphorid spiracle. The centre is occupied by a perforated membrane. Just behind the spiracle the tracheal trunk ends in a sieve chamber in which long hairs project inwards from the wall.

The anterior spiracles occur on the first thoracic segment laterally. Each consists of a mound of strong chitin, the surface of which slopes towards the posterior and contains a pair of slits converging at their posterior ends. They are oval in shape, with a strong chitinous rim and one diagonal bar crossing the lumen towards the bottom end. Behind the slits is a "button", an irregular chitinous scar, and below them is the felt or sieve chamber which is the end of the tracheal trunk. There are no body spiracles visible. If present, they are completely obscured by the scales and bristles.

The head (Text-fig. 2) is of the typical elongate, conical shape, with the central sclerite constricted slightly towards the end and then narrowed to a point forming the labrum. The lateral plates lying each side of the base of the labrum and sheathing the maxillae are more pronounced than those in *Actina incisuralis* (Fuller, 1934). The maxillae extend forwards each side of the labrum, the plumose galeas being normally curved under, occupying a ventral position. A little behind the bases of the maxillae are the antennae (Text-fig. 5), which are lateral and composed of three segments, the basal one being large and mound-like, the second more strongly chitinized, narrow, and much shorter than in *Actina*, and the apical segment small and dome-shaped. The lateral swellings, said to represent rudimentary eyes, are not very well developed in this species, but there is a pigmented spot and a large bristle in a corresponding position in mature larvae. The scales covering the head integument are not conspicuous

and upstanding, being more in the nature of small bosses. The central sclerite is devoid of scales or plates. There are five pairs of small bristles on the under-surface of the head, the posterior pair being nearest the centre. On the dorsal surface are four pairs of large bristles, a pair being associated with the eye spot on each side, a pair at the base of the labrum, and a pair at the base of the lateral plates. There is also a small bristle on each side anterior to the large eye bristles and one each side of the central sclerite near the posterior border of the head.

Mouth parts.—The labrum is the apical termination of the dorsal head plate and lies between the two maxillae, which extend a little in front of it. The labium is situated behind and below the hypopharynx, which is closely appressed to the ventral face of the labrum. The lateral lobes of the head are produced to a point and lie on the outside of the posterior half of the maxillae.

The labrum (Text-fig. 6) is curved ventrally and is wide at the base and narrowed anteriorly. At its apex is a short chitinous point. Below and behind this is a pair of large strong bristles, which project forward and are noticeable from the dorsal surface. Slightly behind these and so curved that it occupies a ventral position is a large plumose structure. It is composed of delicate chitin shaped like a shallow trough and is covered with striations and rows of fine hairs. A narrow, slightly curved chitinous plate lies attached to the ventral surface of the labrum and represents the epipharynx. The hypopharynx (Text-fig. 6) lies close, but not attached, to the epipharynx. It is almost as large as the labrum and consists of an elongated sclerite with a chitinous strut up the centre and a triangular support behind the apex, which is curved, striated and finely toothed.

The labium consists of the mentum, two membranous lobes running from the lateral lobes beneath the maxillae and meeting at the median prementum. The lobes are of thin chitin, small, narrow and ornamented with some fine hairs. The prementum is a small tufted sclerite attached to the ventral surface of the hypopharynx. In a position representing the submentum is a smooth narrow sclerite running back towards the centre of the head and readily detached from the integument.

The maxilla (Text-fig. 7) has the mandible fused with its inner face as in *Actina incisuralis*. It is a comparatively short, broad structure, slightly convex on the outer surface. The dorsal edge is fringed with a row of forwardly-directed bristles. Anterior to these is a small chitinous knob bearing a fan-shaped tuft of bristles. The apex of the maxilla is strongly curved so that the galea is antero-ventral in position. It is a broad piece of delicate chitin bearing combs of fine hooked hairs. Above and behind this is the palp which is short and broad. Most of the ventral edge is occupied by the "banded segment" of Bischoff, a curved piece of chitin with radiating striations and a dissected ventral edge.

The mandible consists of several strong masses of chitin connected by thinner portions. There is a dense rounded mass above the banded segment, a strong bar along the dorsal edge of the maxilla, and another mass near the apex of the maxilla at the base of the palp. The "kaumagen" of Bischoff is a large globular chamber at the posterior end of the pharynx. It contains a large chitinous mass through which runs a rod connecting with a smaller piece of chitin near the anterior end of the chamber. Viewed from the side, however, it is seen to be an

adaptation of the wall of the pharynx, both dorsal and ventral walls being greatly thickened. The dorsal mass of chitin is sharply curved and pressed against the ventral one, the whole appearing to be a valve structure (Text-fig. 10).

Description of the larva of O. brunnipennis.

The larvae examined varied in length from 6 to 14 mm. They are similar in appearance to *O. minor*, but are slightly broader and darker brown in colour, and in general considerably more robust. The body bristles are longer, stouter and darker in colour and the head narrower and more elongate than in *O. minor*.

The larva of *O. brunnipennis* may be distinguished from that of *O. minor* by the following characteristics: The anterior dorso-lateral abdominal bristle is slender and almost as long as the posterior one, whereas in *O. minor* it is short, stout and club-shaped. There are three pairs of dorsal bristles as in the smaller species, but the two innermost pairs are arranged in two straight lines running down the back, whereas in *O. minor* the posterior is slightly lateral to the anterior. In some larvae the dorsal bristles are so long and curved inwards that they meet in an arch over the back.

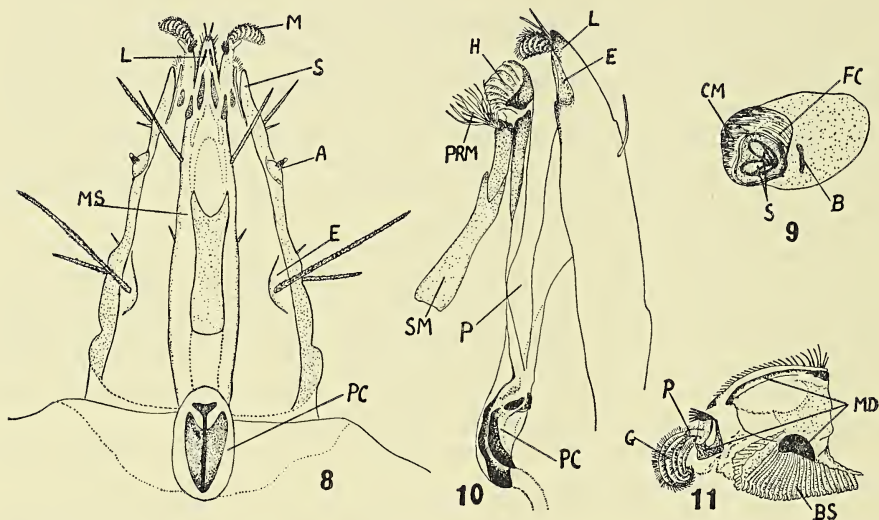
The small body scales are much denser in this species and are just as abundant and close on the ventral as on the dorsal surface. Also, laterally on each segment, both dorsally and ventrally, there is a patch of enlarged integumental plates. They are rounded and light brown in colour and form a roughly circular patch. They occur in the same position and resemble the lateral ring of spots in *Actina incisuralis*. The hexagonal areas of the skin are more pronounced than in *O. minor*, especially on the eighth segment.

There are no visible body spiracles such as occur in other larvae of the same subfamily (Malloch, 1917).

The head (Text-fig. 8) is more elongated than in *O. minor*. The central dorsal sclerite is not more chitinous than the rest of the head but has a smooth surface, whereas the rest is rugose. Near the base of the head are a pair of lateral swellings which are not present in *O. minor*. Anterior to these are the eye rudiments, associated with each of which are two bristles. One arises dorsally and is very large and strong; the other is lateral and smaller. Arising from the median sclerite in a position just anterior to the antennae is another pair of large bristles. Anterior to these is a pair of similar bristles arising from the side lobes of the head. There is one other pair of dorsal bristles situated on the edge of the central sclerite about the middle of the head. They are very small and inconspicuous. The side lobes are prominent at the anterior end of the head, sheathing the maxillae. On the ventral surface is a large oval-shaped sclerite extending from near the posterior edge of the head to the prementum. There is a pair of bristles arising from the lateral edges of the head just anterior to the eye swellings and another pair on the innermost edges of the side lobes. These are much smaller than the dorsal bristles. There is one very small pair near the submentum corresponding to those at the middle of the dorsal sclerite. The anterior part of the ventral surface of the head is occupied by many plumose and membranous structures, namely, the lobes of the mentum, the prementum, the hypopharynx and the plume of the labrum.

The mouth parts.—In arrangement the mouth parts are the same as those of *O. minor*, the labrum and hypopharynx (Text-fig. 10) having the same structure, but naturally being much larger. The plume of the labrum is, however, relatively smaller. The two lobes of the mentum, which are roughly triangular in shape

and stretch from the side lobes to the prementum, are rather more delicate and membranous than in *O. minor*. The apical tuft of hairs on the prementum is rather more profuse in this species. The submentum is conspicuous, being large, more chitinized than the surrounding integument and forked at the anterior end, where it connects with the rest of the labrum. The "kaumagen" is essentially the same in both, the central chitinous mass being more elongated in *O. brunnipennis*.



Text-figs. 8-11. *Ophiodesma brunnipennis*.

8.—Head of larva, $\times 30$. a, antenna; e, eye rudiment; l, labrum; m, maxilla; ms, median sclerite; pc, pharyngeal chamber; s, side lobe.

9.—Anterior spiracle, $\times 56$. b, button; cm, chitinous mound; fc, felt chamber; s, slits.

10.—Labrum and hypopharynx, $\times 30$. e, epipharynx; h, hypopharynx; l, labrum; p, pharynx; pc, pharyngeal chamber; prm, prementum; sm, submentum.

11.—Maxilla, $\times 56$. bs, banded segment; g, galea; md, mandible; p, palp.

The puparium.

In both species the method of pupation and dehiscence of the puparium is the same. Pupation takes place inside the old larval skin, which becomes hard and inflexible. There is no external change in appearance except that the hexagonal plates of the integument become more noticeable. Dehiscence takes place by the splitting off of the first segment and head in the form of a cap and by the median, longitudinal cleavage of the second, third and fourth segments, the last also splitting transversely.

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